3 PROJECT AREA SETTING

This section describes the action area for the removal of the pipeline. The action area is the defined geographic area potentially affected by the proposed Project. For the purpose of establishing baseline conditions from which to evaluate potential effects of the Project, the types of activities, as well as physical conditions such as substrate composition and timing, were examined and evaluated. The Project component that poses potential impacts to the species and their habitat is resuspended sediments and disturbance of benthic habitat from the removal of the pipeline. The action area for this Project is described as the extent of the pipeline and approximately 10 ft on either side of the pipeline (approximately 40,000 square feet/0.92 acres). In addition, the barge and riprap area comprise <0.01 acres.

3.1 Physical indicators

San Pablo Bay is part of a large, complex, and highly dynamic estuary. Circulation within the Bay is dependent upon tides, river flow, winds and bathymetry. It also receives inputs from stormwater runoff and wastewater from municipal and industrial sources that vary in proportion depending on the location and seasonal weather patterns. The pipeline is located within an area influenced by these hydrodynamic conditions. Current and wave patterns exhibited in the area are largely generated by the tides interacting with bottom and shoreline configurations.

Water Quality

The Project area lies within the San Francisco Bay Area Hydrologic Basin. The San Francisco Bay functions as the drainage outlet for waters of the Central Valley and includes the main Bay segments such as San Pablo and Suisun Bays. Because of its highly dynamic and complex environmental conditions, the basin supports an extraordinarily diverse and productive ecosystem. San Francisco Bay can be divided into distinct water bodies that have different physical and chemical properties. The northern reach includes three major embayments: Suisun Bay, San Pablo Bay, and Central Bay. Over 90 percent of the estuary's fresh water originates from the Sacramento- San Joaquin drainage basin and enters the northern reach. The Sacramento River provides about 80 percent of this flow, and the San Joaquin River and other tributaries, listed below, contribute the remainder. The remaining 10 percent of freshwater comes from the San Francisco Bay watershed and wastewater treatment plants `and flows into the southern reach. In the San Francisco Bay Basin Plan, the Regional Water Quality Control Board (RWQCB) identifies a number of beneficial uses of San Pablo Bay that must be protected. The beneficial uses include commercial and sport fishing, estuarine habitat, industrial service supply, fish migration, navigation, recreation, wildlife habitat, estuarine

San Pablo Bay receives water from several major tributaries: Gallinas Creek, Novato Creek, Petaluma River, Sonoma Creek, Wildcat Creek and Napa River. Of these, the Petaluma and Napa Rivers are the largest. However, the major sources of water to the bay are the Sacramento/San Joaquin delta to the east, and the ocean tides.

Since 1993, the Regional Monitoring Program (RMP) for Water Quality in the San Francisco Estuary associated with SFEI, collects water quality data and provides reports annually. The annual monitoring consists of conventional water quality parameters (ammonia, conductivity, dissolved oxygen, dissolved organic carbon, silicates, hardness, nitrate, nitrite, pH, phosphate, salinity, temperature, suspended solids, phaeophytin, and chlorophyll); trace elements (aluminum, arsenic, cadmium, cobalt, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc); trace organics (including PAHs, PCBs, phthalates, polybrominated diphenyl ethers, and pesticides); and toxicity. Water quality pollutants contained in the Bay at detectable levels include trace metals, pesticides, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), algae blooms/low dissolved oxygen, and sediment contamination. The most recent annual RMP report indicates that, with the exception of PCBs, water quality conditions remain within water quality objectives established by the SFRWQCB for the parameters monitored.

Tidal Influence

Tidal currents in San Francisco Bay consist of semidiurnal and diurnal partial tides (USGS, 1984). Two high tides with unequal amplitudes and two low tides with unequal amplitudes occur in roughly a 24 hour period with pronounced spring-neap tidal variations (USACE, 1990). The Bay-wide tidal prism is large – representing 24 percent of the Bay volume – given the low average water depth of the Bay (6.1 meters [m]) (Conomos, 1979; Conomos et al., 1985). Specific tidal effects in the Bay are area-dependent. The Site is located along the south shore of what is referred to as San Pablo Bay.

Daily tidal fluctuations in the Bay affect sediment transport in the vicinity of the Site. Each day, an enormous volume of salt water is transported into and out of the estuary, causing strong currents that move water landward during rising (flooding) tides and seaward during falling (ebbing) tides. Under the appropriate velocities, this tidal action can facilitate either deposition or erosion, depending largely on wind-wave generated turbulence (Schoelhamer 2002). The U.S. Geological Survey (USGS) is in the process of measuring tidal exchange affects on sediment transport, but data are not currently available for the Site vicinity.

Resuspended Sediment/Turbidity

Suspended sediments are a key component of the estuarine system. The terms turbidity and suspended sediments are often used interchangeably. Turbidity refers to a number of different suspended particulates including plankton and sediments. Suspended sediments refer to the actual sediment component in the water column. Most near shore environments, and estuaries in particular, tend to have higher levels of turbidity or suspended sediment loads due to discharges from rivers, drainages and the relative shallow nature of the environment.

Suspended sediment concentrations in San Francisco Bay tend to be extremely variable and strongly correlated to season and water depth (Buchanan and Ganju, 2006and 2005, McKee, Ganju, Schoelhamer, 2006). Several groups, including the San Francisco Estuary Institute (SFEI) and the U.S. Geological Survey (USGS), have monitored suspended sediment loads throughout San Francisco Bay for many years. Suspended sediment concentrations have ranged from well over 1,000 milligrams per liter (mg/L) near the bottom, to as little as 10 mg/L in near surface measurements (Buchanan and Ganju, 2006). The Action Area footprint where the pipeline will be removed is in relatively shallow water with water depths ranging between -0 and -8 feet MLLW. This area is influenced by nearshore discharges, currents, and wind- generated sediment disruption.

Resuspended sediments can influence the behavior, distribution and growth of listed species. Water quality in the action area may be slightly impacted during construction activities. Disturbance of soft bottom sediments during the removal of the pipeline is likely to result in temporarily increased levels of suspended sediments/turbidity and potential release of contaminants from sediments in the substrate.

High levels of turbidity may affect fish by disrupting normal feeding behavior, reducing growth rates, increasing stress levels, and reducing respiratory functions (Benfield and Minello 1996; Nightingale and Simenstad 2001). Review of the literature regarding the effects of turbidity associated with construction in the aquatic environment on anadromous salmonids indicates turbidity may interfere with visual foraging, increase susceptibility to predation, and interfere with migratory behavior. There is little direct information available to assess the effects of turbidity in San Francisco Bay estuary on juvenile or adult green sturgeon. The green sturgeon forages in bottom sediments and thus is well adapted to living in estuaries with fine sediment substrate and is tolerant of elevated levels of turbidity.

The extent of turbidity or resuspended sediments directly resulting from removal of the portion of pipeline that is submerged will depend on the tide, currents, and wind conditions during these activities. It is anticipated that the increased turbidity will be minor and localized due to the type of work performed by this Project. These areas of turbidity are expected to rapidly disperse from the Project area with tidal circulation, as strong currents are typical in this area.

Listed species in the estuary commonly encounter areas of increased turbidity due to storm flow runoff events, wind and wave action, and benthic foraging activities of other aquatic organisms. Fish generally react by avoiding areas of high turbidity and return when concentrations of suspended solids are lower. The minor and localized areas of turbidity associated with removal of the submerged portion of the pipeline is not expected to result in harm or injury, or behavioral responses that impair migration, foraging, or make listed fish more susceptible to predation. If listed fish species temporarily relocate from areas of increased turbidity, areas of similar value are available adjacent to the work site which offer habitat of equal or better value for displaced individuals. Adjacent habitat areas also provide adequate carrying capacity to support individual fish species that are temporarily displaced during the Project's construction activities.

Although removal of the pipeline may increase turbidity for a short period of time (3 weeks), operations will be restricted to the period between June 1 and October 31. This period avoids the migration seasons of both adult and juvenile anadromous salmonids; thus, no direct effects to CCC steelhead, CV steelhead, Sacramento River winter-run Chinook salmon, and CV spring-run Chinook are expected to occur. Green sturgeon, delta smelt and longfin smelt may be in the area year-round and may be exposed to the direct effects of the temporary disturbance of suspended sediments by the Project.

Sediment Quality

The sediment that has accumulated in the area of the pipeline is considered recent deposition of unconsolidated (loose) sediment. This material accretes or accumulates as a result of natural sediment inflows from rivers, creeks, surface runoff, and, from re-settlement of sediment suspended in Bay waters by natural processes (i.e., tidal action, wind, etc.).

Pipeline removal activities could resuspend chemicals of concern (COCs) into the water column. Resuspension of sediments within the water column increases the exposure potential of COCs and their bioavailability to receptors within the area. However, most organic contaminants in sediment are tightly bound and are not easily released during short-term resuspension. To address concerns related to potential resuspension of COCs the sediment within the project site was collected, tested for COCs and submitted for a suspended sediment bioassay test.

A sampling and analysis plan was developed and submitted to the DMMO agencies. The federal and state agencies that comprise the Dredge Material Management Office (DMMO) and are responsible for regulating sediment management programs in the San Francisco Bay area include: the U.S. Environmental Protection Agency, Region 9, (USEPA); the U.S. Army Corps of Engineers, San Francisco District, (USACE); the San Francisco Regional Water Quality Control Board, Region 2, (RWQCB); the Bay Conservation and Development Commission (BCDC); and the State Lands Commission (SLC) as well as the federal and state resource agencies NMFS, USFWS and California Department of Fish and Wildlife (CDFW).

The SAP was approved by the DMMO and resource agencies (PER 2012). In order to assess whether resuspended sediments will represent an adverse impact during pipe removal operations and per the approved Sampling and Analysis Plan (PER 2013), field personnel collected sediment cores approximately 1 foot below the estimated pipeline depth or refusal along the length of the buried portion of the pipeline (approximately 1,200 ft of pipeline). In areas where the pipeline is exposed (approximately 800 ft of pipeline), surface samples were collected using a Van-Veen sampler. A composite sample comprising equal portions of the sediment cores and surface sediment samples was then submitted for chemical and biological analysis as per the approved SAP (PER 2013). Eight samples were collected from the wastewater outfall pipeline area (Figure 3-1). A detailed results document was generated and is provided as Appendix A. Tables 3-1 through 3-5 summarize the chemical and conventional parameters from the composite sample.

The “HP-Comp” site sediment was ~61.9% total solids, and was 100% fines (silts and clays). TOC levels were moderate (1.0%). All of the metal analytes for the HP-Comp sediments were similar to or below San Francisco Bay (SF Bay) background levels (SFRWQCB 1998). While the cadmium level was slightly above SF Bay background levels, it was below the cadmium Effects Range-Low (ER-L) of 1.2 mg/kg (Long et al 1995) and is unlikely to cause an adverse biological effect. Organotins and organochlorine pesticides were below their respective MDLs. Total PAHs, total PCBs, and total DDTs were reported at 1,207 µg/kg, 19.3 µg/kg and 0 µg/kg, respectively; each was below SF Bay background levels (SFRWQCB 1998).(This data looks favorable- good)

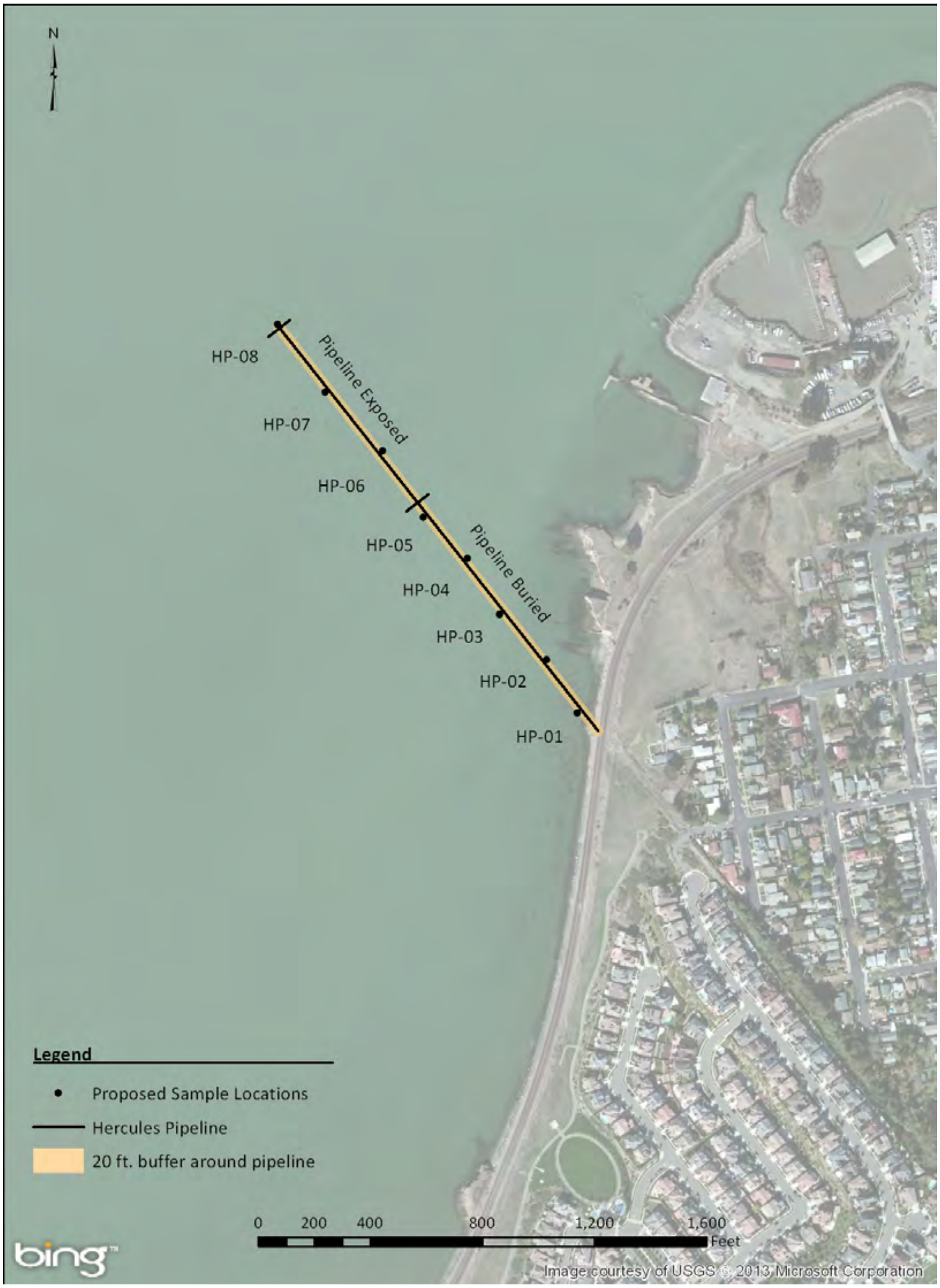

Figure 3-1 Sediment Sampling Station Locations

Table 3-1. Hercules Pipeline Sediment Grain Size, Total Solids (%), and Total Organic Carbon (%).

Analytes	HP-Comp
% Gravel	0.0
% Sand	0.0
% Silt	53.1
% Clay	46.9
Total % Fines (silt & clay)	100
Total Solids (%)	61.9
Total Organic Carbon (%)	1.0

Table 3-2. Hercules Pipeline Sediment Metals Concentrations (mg/kg, dry wt).

Metals	HP-Comp	Bay Ambient <100% Fines
Arsenic	6.34	15.3
Cadmium	0.438[a]	0.33
Chromium	37.3	112
Copper	25.0	68.1
Lead	17.5	43.2
Mercury	0.164	0.43, (0.469)[b]
Nickel	37.0	112
Selenium	<0.118	0.64
Silver	0.129 J	0.58
Zinc	59.3	158
Butyltin	<1.1	
Dibutyltin	<1.1	
Tributyltin	<0.93	
Tetrabutyltin	<1.2	

Notes: a - Result is below the cadmium ER-L of 1.2 mg/kg (Long et al 1995).
b - San Francisco Bay 99th percentile mercury concentration (SFEI 2013)

Table 3-3. Hercules Pipeline Sediment PAH Concentrations (µg/kg, dry wt).

PAHs	HP-Comp	Bay Ambient <100% Fines
Acenaphthene	<2.9	26.6
Acenaphthylene	12 J	31.7
Anthracene	41	88
Benzo(a)anthracene	44	244
Benzo(a)pyrene	61	412
Benzo(b)fluoranthene	200	371
Benzo(e)pyrene	130	-
Benzo(g,h,i)perylene	60	310
Benzo(k)fluoranthene	160	258
Biphenyl	2.5 J	-
Chrysene	66 J	289
Dibenzo(a,h)anthracene	15 J	32.7
2,6-Dimethylnaphthalene	11 J	-
Fluoranthene	60	514
Fluorene	6.0 J	25.3
Indeno(1,2,3-cd)pyrene	57	382
2-Methylnaphthalene	4.2 J	-
1-Methylnaphthalene	<3.2	-
1-Methylphenanthrene	<2.6	-
Naphthalene	8.4 J	55.8
Perylene	40	-
Phenanthrene	26	237
Pyrene	200	665
1,6,7-Trimethylnaphthalene	<2.3	-
Dibenzothiophene	2.2 J	-
Total Detected PAHs	**1,207**	**3,390 4800[a]**

a - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).

J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.

All results below the MDL are reported as < the MDL.

Table 3-4. Hercules Pipeline Sediment Organochlorine Pesticide Concentrations (µg/kg, dry wt).

Organochlorine Pesticides	HP-Comp	Bay Ambient <100% Fines
Aldrin	<0.51	1.1
alpha-BHC	<0.52	-
beta-BHC	<0.43	-
delta-BHC	<0.41	-
gamma-BHC (Lindane)	<0.56	-
Total Detected BHC	**0**	**0.78**
Alpha Chlordane	<0.52	
Gamm Chlordane	<0.51	
Oxychlordane	<0.45	
Chlordane	<5.3	1.1, 37[a]
Dieldrin	<0.53	0.44, 1.9[a]
Endosulfan I	<0.42	-
Endosulfan II	<0.45	-
Endosulfan Sulfate	<0.55	-
Endrin	<0.58	-
Endrin Aldehyde	<0.39	-
Endrin Ketone	<0.56	
Heptachlor	<0.52	-
Heptachlor Epoxide	<0.57	-
Methoxychlor	<0.52	
Cis-nonachlor	<0.47	
Trans-nonachlor	<0.47	-
Toxaphene	<10	-
2,4'-DDD	<0.55	see total DDT
4,4'-DDD	<0.51	see total DDT
2,4'-DDE	<0.49	see total DDT
4,4'-DDE	<0.48	see total DDT
2,4'-DDT	<0.49	see total DDT
4,4'-DDT	<0.54	see total DDT
Total Detected DDT	**0**	**7.0, 50[a]**

a - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.
All results below the MDL are reported as < the MDL.

Table 3-5. Hercules Pipeline Sediment PCB Congener Concentrations (µg/kg, dry wt).

PCBs	HP-Comp	Bay Ambient <100% Fines
PCB 008	<0.14	a
PCB 018	<0.25	a
PCB 028	<0.16	a
PCB 031	<0.19	a
PCB 033	<0.18	a
PCB 044	0.33 J	a
PCB 049	0.61 J	a
PCB 052	0.73 J	a
PCB 056	<0.22	a
PCB 060	<0.17	a
PCB 066	0.31 J	a
PCB 070	0.50 J	a
PCB 074	<0.15	a
PCB 087	0.41 J	a
PCB 095	1.3	a
PCB 097	0.70 J	a
PCB 099	0.81	a
PCB 101	1.9	a
PCB 105	0.56 J	a
PCB 110	1.7	a
PCB 118	1.6	a
PCB 128	0.53 J	a
PCB 132	<0.27	a
PCB 138/158	2.0	a
PCB 141	0.31 J	a
PCB 149	1.2	a
PCB 151	0.25 J	a
PCB 153	1.9	a
PCB 156	0.32 J	a
PCB 170	0.33 J	a
PCB 174	0.27 J	a
PCB 177	<0.20	a
PCB 180	0.44 J	a
PCB 183	<0.18	a

Table 3-5. cont. Hercules Pipeline Sediment PCB Congener Concentrations (µg/kg, dry wt).

PCBs	HP-Comp	Bay Ambient <100% Fines (SFRWQCB 1998)
PCB 187	0.25 J	a
PCB 194	<0.15	a
PCB 195	<0.085	a
PCB 201	<0.092	a
PCB 203	<0.17	a
Total Detected PCBs	**19.3[d], 12.4[e]**	22.7, 29.3[b] 17.0[c]

a - No reference value has been established for the individual congeners; the Total Detected PCB congener reference value (SFRWQCB 1998) is used as a default value.
b - San Francisco Bay 99th percentile PCB concentration (SFRWQCB 2013).
c - San Francisco Bay Bioaccumulation Trigger Level (USACE/USEPA 2011, SFEI 2013).
d - Summary includes J flagged data.
e - Summary excludes J flagged data.
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit; the reported value is therefore an estimate.
All results below the MDL are reported as < the MDL.

In addition, the suspended sediment bioassay was conducted as well. The 96-hr survival test with *Americamysis bahia* was performed on the sediment elutriate to determine whether resuspended sediments would represent an adverse impact during pipeline removal operations. Positive and negative Lab Control treatments were tested concurrently with the site sediment elutriate.

The test results for the sediment composite elutriate were compared with the test organism responses at the negative Lab Control treatment to determine the potential impact of suspended sediment resulting from the proposed pipeline removal on pelagic organisms in the near vicinity. The following criteria were used:

1. If the survival response in the 100% sediment elutriate treatment is ≥ the Control (clean seawater) treatment response(s), the sediment is <u>not</u> predicted to be acutely toxic to water column organisms.
2. If the reduction in survival response in the 100% sediment elutriate treatment relative to the Control treatment is ≤10%, there is no need for statistical analyses and no indication of water column toxicity attributable to the test sediments.
3. If the reduction in survival response in the 100% sediment elutriate treatment relative to the Control treatment is >10%, then the data must be evaluated statistically to determine the magnitude of toxicity.

The results of this test are summarized below in Table 3-6. There was 100% survival at the Control treatment, indicating an acceptable survival response by the test organisms; there was 98% survival in the Site Water. There were ***no*** significant reductions in survival in any of the elutriate treatments; the No Observable Effect Concentratoin (NOEC) was 100% elutriate indicating that the 100% elutriate sample was not toxic to mysids.

Table 3-6. Effects of HP-Comp Sediment Elutriate on *Americamysis bahia.*

Test Treatment	Mean % Survival
Lab Control	100
1%	98
10%	100
50%	100
100%	100
Site Water	98
Survival NOEC =	100% elutriate[a]
Survival LC50 =	>100% elutriate[a]

a - Due to the absence of significant impairment, the LC50 could not be calculated but can be determined by inspection to be >100% elutriate.

Based on these results, sediments that may be displaced or resuspended during the removal of the Hercules pipeline would not represent an adverse environmental impact to species in the immediate or general vicinity of operations.

3.2 Habitats

The predominant habitat at the Project site is aquatic, including open water (pelagic), soft sediment (benthic) and intertidal rip rap. The open waters of San Pablo Bay vary in temperature, salinity, dissolved oxygen, and turbidity within the water column depending on water depth, location, and season. The water column can be classified as shallow-water/shoals and deepwater/channels (NOAA 2007). The water column provides habitat for plants (phytoplankton), invertebrates (zooplankton), fishes, birds, and marine mammals.

The fish community inhabiting San Pablo Bay and the western portions of Suisun Bay, including the Project site, is dominated by northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), American shad (*Alosa sapidissima*), jacksmelt (*Atherinopsis californiensis*), longfin smelt (*Spirinchus thaleichthys*), and striped bass (*Morone saxatilis*). Seasonally, Chinook salmon (*Onchorhynchus tshawytscha*) becomes a dominant species and the delta smelt (*Hypomesus transpacificus*) can also be present as well as adult steelhead trout and smolts (*Onchorhynchus mykiss*) (See Section 4 for more detail on these listed species.)

More than 30 fish taxa have been observed inhabiting or utilizing the benthic habitat of San Pablo Bay between 2000 and 2007. This fish community is dominated by the Bay goby (*Lepidogobius lepidus*), English sole (*Parophrys vetulus*), striped bass (*Morone saxatilis*), plainfin midshipman (*Porichthys notatus*), Pacific staghorn sculpin (*Leptococottus armatus*), longfin smelt (*Spirinchus thaleichthys*), yellowfin goby (*Acanthogobius flavimanus*), cheekspot goby (*Ilypnus gilberti*), white croaker (*Genyonomus lineatus*), speckled sanddab (*Citharichthys stigmaeus*), shiner surfperch (*Cymatogaster aggregata*), California halibut (*Paralichthys californicus*), starry flounder (*Platichthys stellatus*), Pacific herring (*Clupea pallasii*), American shad (*Alosa sapidissima*), and diamond turbot (*Pleuronichthys guttulatus*) (CDFG Interagency Ecological Program 2000-2007). Several of the groundfish listed above, such as English sole and starry flounder, as well as other occasional inhabitants such as sand sole (*Psettichthys melanostictus*) and big skate (*Raja binoculata*), are covered by the Pacific Groundfish Management Plan which identifies San Francisco Estuary as Essential Fish Habitat (EFH) for these species (*Olberding 2008*). The North American green sturgeon (*Acipenser medirostris*) is known to inhabit the waters and bottom (benthic) habitat of San Pablo Bay.

San Pablo Bay Intertidal Habitat - The pipeline reaches land and is protected by quarried rock and concrete debris. This shoreline riprap provides some hard bottom intertidal habitat that supports barnacles, bryozoans, hydrozoans, the bay mussel, occasional sponges, and green algae. In addition, several species of crabs, isopods, snails, and amphipods may also be present.

Soft bottom substrate ranges between soft mud with high silt and clay content and areas of sand. These latter tend to occur in locations subjected to high tidal or current flow. The predominant seafloor habitat in the Project area is soft sediment composed of combinations of mud/silt/clay particles. Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms within these soft sediments. These areas support mollusks, amphipods, polychaetes and several species of polydora (USFWS 1988).